

BY ORDER OF THE COMMANDER  
914 AIRLIFT WING

914 AW INSTRUCTION 48-000  
18 NOVEMBER 1997

Aerospace Medicine

## WORKPLACE ERGONOMICS PROGRAM

This instruction establishes procedures for the base level ergonomics program. It implements AFPD 48-1, Aerospace Medical Program, DOD Ergonomics Program Requirements Letter, dated 4 February 1997. This instruction applies to all 914th Airlift Wing personnel. The instruction does not apply to contractor operations or government-owned, contractor-operated operations.

**1. Objectives.** The objective of this instruction is to minimize the negative impact on the Air Force (AF) mission accomplishment by preventing Work-related Musculoskeletal Disorders (WMD) among AF employees.

**2. Definitions.**

**2.1. Awkward Posture.** A deviation from the neutral position of any particular joint. Examples include extreme flexing, extending, bending or rotating parts of the body; reaching behind the trunk; holding arms above the shoulders; etc.

**2.2. Contact Stress.** A type of trauma inflicted by direct contact of various body parts with workpieces, tools, or work surfaces. Mechanical stress generated on tendons and nerves can lead to WMD.

**2.3. Ergonomics.** The field of study that seeks to fit the job to the person, rather than the person to the job. This is achieved by the evaluation and design of workplaces, environments, jobs, tasks, equipment, and processes in relationship to human capabilities and interactions in the workplace.

**2.4. Fixed Postures.** Prolonged muscle contraction without movement. Examples include stringing wire overhead and prolonged gripping of a hand tool.

**2.5. Potential Problem Job.** A combination of tasks for which one or more employees report a WMD, or for which signal risk factors show a potential risk for developing WMD.

**2.6. Risk Factors.** Actions in the workplace, workplace conditions, or a combination thereof, that may cause or aggravate a work-related musculoskeletal disorder. Workplace risk factors include, but are not limited to, repetitive, forceful or prolonged exertions; frequent or heavy lifting; pushing, pulling, or carrying of heavy objects; fixed or awkward work posture; contract stresses; localized or whole-body vibration, cold temperatures and poor lifting (leading to awkward postures). These workplace risk factors can be intensified by work organization characteristics such as inadequate work-rest cycles, excessive work pace and/or duration, unaccustomed work, lack of task variability, machine work, and piece rate.

**2.7. Routine Exposure.** Approximately daily; three or more days per week.

**2.8. Signal Risk Factors.** Set of criteria that can be used for recognizing potential problem jobs resulting from routine exposure: Repetitive motions for >2 hours at a time or >4 hours/day; Fixed or awkward postures for >2 hours/day; Forceful hand exertions for >2 hours/day; Vibration from tools (or equipment) for >2 hours/day; manual material handling >2 hours/day; Unassisted lifting of loads >25 pounds.

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Certified by: Mr. Edward J. Primeau

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**2.9. Work-related Musculoskeletal Disorder.** An injury or an illness of the muscles, tendons, ligaments, peripheral nerves, joints, cartilage (including intervertebral discs), bones and/or supporting blood vessels in either the upper or lower extremities, back, or neck, that is associated with musculoskeletal disorder workplace risk factors and are not limited to cumulative trauma disorders, repetitive strain injuries or illnesses, repetitive motion injuries or illness, and repetitive stress injuries or illnesses. Refers collectively to signs, or persistent symptoms, or clinically-diagnosed work-related musculoskeletal disorders when they are caused or aggravated by exposure to workplace risk factors.

### **3. Responsibilities:**

#### **3.1. Commanders.**

3.1.1. Ensure workplaces and processes do not expose employees to known WMD risks.

3.1.2. Ensure workstations, devices, tools, and equipment are properly designed and do not contribute to WMD.

3.1.3. Provide adequate resources to meet the responsibilities in the Air Force Premier Program.

3.1.4. Ensure supervisors and workers receive appropriate training on prevention of WMD.

#### **3.2. Supervisors.**

3.2.1. Encourage workers to promptly report signs and symptoms of WMD suspected to be associated with the job.

3.2.2. Assist in identifying ergonomic hazards and stresses in the work area.

3.2.3. Take action to eliminate or minimize ergonomic risk factors that are associated with injury or illness.

3.2.4. Consult with workers and review improvements that will abate the ergonomic risk factors.

3.2.5. Enforce the use of required measures to control ergonomic risk factors, including engineering controls, administrative controls, work practice controls, and personal protective equipment.

3.2.6. Attend WMD awareness education when provided.

3.2.7. Provide or arrange job-specific WMD prevention training to employees as specified in the AF Premier Program.

3.2.8. Inform Bioenvironmental Engineering of plans for new or modified operations, jobs, or procedures.

3.2.9. Ensure employees with signs or symptoms of WMD are promptly evaluated by a health care provider.

3.2.10. Ensure employees participate in efforts to remove ergonomic risk factors from their processes.

#### **3.3. Bioenvironmental Engineering Services (BES).**

3.3.1. Document work analysis in the industrial case file or facility folder.

3.3.2. Prioritize and perform work analysis using a risk based approach.

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- 3.3.3. Assist supervisors in selecting the appropriate control measures to eliminate or minimize ergonomic risk factors.
- 3.3.4. Evaluate the effectiveness of the implemented controls in eliminating or minimizing risk factors.
- 3.3.5. Investigate reported or suspected WMD.
- 3.3.6. Review plans for new or modified operations to ensure ergonomic design principles have been considered.
- 3.3.7. Assist the ground safety manager with investigating incidents when routine risk factors may have contributed to the injury.
- 3.3.8. Assign risk assessment codes (RACs) to know WMD hazards.
- 3.3.9. Coordinate with installation Chief or Civilian personnel and the ground safety manager to establish an on-going installation surveillance process for WMD.
- 3.3.10. Compile injury and illness data to determine WMD incidence, severity, and restricted workday rates in problem jobs and provide this information to the Combined Safety Council.
- 3.3.11. Review the results of reported WMD and risk factor data for trends.
- 3.3.12. Administer job requirements and physical demands surveys (JR/PD) to employees in potential problem jobs.
- 3.3.13. Analyze data for association among ergonomic risk factors, employee discomfort, and reported WMD (if available) and reports results.
- 3.3.14. Provide WMD awareness education and training to supervisors, workers, health care providers, and other installation personnel.
- 3.3.15. Evaluate the effectiveness of the controls in reducing employee discomfort and WMD incidence.
- 3.3.16. Document JR/PD results in the appropriate workplace case file.
- 3.4. Ground Safety Manager.
  - 3.4.1. Maintain and analyze basic information about injuries and trends in coordination with BES.
  - 3.4.2. Compile basic information about the musculoskeletal injuries, such as type of work being performed, when and where the incident occurred, the body parts involved, and the classification of the injury.
  - 3.4.3. Assist BES in work analyses, as requested.
  - 3.4.4. Investigate musculoskeletal injuries associated with single incidents.
- 3.5. Civilian Personnel. Provide BES with civilian WMD data including compensation costs, lost workdays, and restricted workdays.
- 3.6. Workers.

- 3.6.1. Participate in activities designed to anticipate, recognize, evaluate, and control ergonomic risks.
- 3.6.2. Provide suggestions for improving the work environment regarding potential or actual ergonomic risk factors.
- 3.6.3. Promptly report to supervisor musculoskeletal complaints or symptoms suspected to be associated with the job.
- 3.6.4. Attend WMD awareness education and specific job training as directed.
- 3.6.5. Comply with required control measures that reduce ergonomic risk factors.
- 3.7. Medical Services.
- 3.7.1. Properly identify, document, and report occupationally-related WMD.
- 3.7.2. Prescribe medically appropriate restrictions from normal duty to mitigate the effects of ergonomic stresses.

#### 4. Workplace Analysis:

##### 4.1. Case Initiated.

4.1.1. BES interviews the patient and investigates specific cases of alleged illnesses and repetitive injuries. BES assesses whether the risk factors associated with the task could be causative factors in the illness or repetitive injury reported.

4.1.2. The findings are recorded on the AF Form 190, and then forwarded to the Medical Facility for inclusion in the medical records.

4.1.3. Recommended changes or solutions shall *not* be documented on the AF Form 190s or other reports that are included in the medical records. The report that is documented in the medical records should address only risk factors and their potential to contribute to the injury or illness.

4.1.4. When appropriate, BES sends a separate report of any recommended solutions to the commander, facility manager, or supervisor. Any recommendations should include a broad range of input from the employees and the work supervisors to make sure the specific needs of the user have been considered.

4.1.5. If the BES evaluation determines that there are other workers with similar risk factors, then the job should be classified as a potential problem job.

##### 4.2. Trend Analysis.

4.2.1. BES reviews a variety of data sources to identify jobs with adverse WMD trends. Jobs with adverse WMD trends should be classified as potential problem jobs.

4.2.2. Examples of data sources include: Workers' Compensation claim data (primarily U.S. Department of labor Forms CA-1, Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation, and CA-2, Notice of Occupational Disease and Claim for Compensation); Occupational Safety and Health Administration (OSHA) 200 Logs; AF Form 190, Occupational Illness Investigation.

4.2.3. BES will take measures to ensure patient confidentiality is maintained during data review and analysis.

#### 4.3. Job Survey.

4.3.1. Industrial work supervisors, as part of the required Job Safety Analysis (JSA), periodically screen jobs and compare their observations with signal risk factors.

4.3.2. BES reviews the JSA evaluations during periodic industrial hygiene visits. Each job exceeding one or more of the signal risk factors should be classified as a potential problem job.

#### 4.4. Validating Problem Jobs.

4.4.1. Potential problem jobs may be validated by the administration of a JR/PD.

4.4.2. The voluntary and anonymous JR/PD is administered by BES. To the extent practical, workers should be grouped so those who perform similar activities and use similar equipment are surveyed as a homogeneous exposure group. A sufficient number of workers (> 80%) need to be surveyed to insure a representative sample.

4.4.3. BES educates the employees sufficiently so the surveys will be done correctly.

4.4.4. BES analyzes the survey data to establish discomfort prevalence ratios, to help identify associations between ergonomic risk factors and employee discomfort, to verify the completeness of the illness and injury data, and to help identify specific activities that may need further analysis.

4.4.5. BES files the results in the appropriate case file or building folder.

#### 4.5. Analyzing Problem Jobs.

4.5.1. BES conducts a work analysis of the risk factors for each problem job. This analysis may be included as part of the periodic industrial hygiene survey. An analysis for a job that has been shown to cause injury or illness should be done within 60 days of that determination.

4.5.2. The work analysis will target the risk factors that are associated with the areas of the body that have been identified as having discomfort, pain, illness, or injury.

4.5.3. Where practical, the work analysis should include videotape documentation of the specific processes and activities being evaluated. These videotapes can be used to compare and contrast changes in tasks and risk factors.

4.5.4. Each work analysis attempts to either match risk factors with known solutions or quantify risk factors so solutions can be devised to reduce the risk. In cases where there is a complex interaction of ergonomic risk factors and where serious problems exist, the work analysis should quantify the risk factors to the extent practical.

4.5.5. BES sends a report of the work analysis to the supervisor of the work group. BES keeps a copy in the appropriate case file of facility folder. This report may be included as part of a periodic industrial hygiene survey.

5. Hazard Prevention and Control: The work group supervisor and the affected workers attempt to select control measures that will abate the risk factors. Upon request, BES assists the supervisor and employees with

advice on which control measure are likely to eliminate or reduce the risk factors that are associated with injury or illness.

#### 5.1. Engineering Controls.

5.1.1. Engineering controls are the preferred and first-line method of control when they are feasible. These measures include manipulating or changing the design of the job, the workstation, the tools, or the equipment used by the worker.

5.1.2. If permanent engineering controls cannot be immediately implemented, temporary measures to modify or minimize the identified risk factors should be employed.

5.1.3. Some engineering control changes may require approval by the AFMC depot manager who develops the technical orders that govern work operations.

#### 5.2. Work Practice Controls.

5.2.1. Work practice controls generally involve changing or improving procedures routinely followed by the worker. These practices include timely equipment maintenance, routine tool-sharpening, appropriate tool selection, proper orientation of the work, the arrangement of the work surface.

5.2.2. Some work practice control changes may require approval by the AFMC depot manager who develops the technical orders that govern work operations.

#### 5.3. Administrative Controls.

5.3.1. Administrative controls consist of workplace requirements that reduce the duration, frequency, and forcefulness of ergonomic stressors.

5.3.2. Using administrative controls can be useful and cost-effective adjunct to engineering and work practice controls. A simple example is when keyboard operators mix up their work by keyboarding, filing, and distributing materials so there are natural breaks in the work.

5.3.3. The disadvantage of administrative controls is that the measures can effectively mitigate the risk factors only when the workers' behavior is carefully regulated.

#### 5.4. Personal Protective Equipment.

5.4.1. Gloves and padding must be carefully selected for fit, thickness, and material to be effective. The selection must also account for other hazards in the area such as chemical hazards, moving parts, and run-in points.

5.4.2. Devices worn on or attached to the wrist, back, or other joints to retard movement or provide support are *not* considered PPE for WMD hazards. BES or the ground safety manager will not recommend these devices. See AFOSH Standard 91-31, *Personal Protective Equipment*.

#### 5.5. Effectiveness of Controls.

5.5.1. After the recommended controls are in place and used, BES resurveys the job to determine if the controls reduce employee exposure to risk factors without introducing new ones.

5.5.2. After the recommended controls have been used for 6 to 12 months, BES may readminister JR/PD to the work group. These surveys should duplicate the original conditions to the extent practical so the results can be compared to the initial discomfort survey. Reduced employee is a good indicator that the control measures in place are working.

5.5.3. Based on the evidence, the Aerospace Medicine Council (AMC) determines if the problem job designation should be removed.

#### 6. Health Care Management:

6.1. Medical management reduces WMD through early diagnosis and treatment. When the health care provider deem it necessary, they may participate in the work site assessments and job evaluations.

6.2. Health care providers may recommend that an employee return to the same job with temporary activity restrictions during recovery or rehabilitation.

6.3. When medical restriction has been recommended, the supervisor makes sure that the assigned job does not violate the medical restriction.

6.4. Upon request, BES will evaluate the tasks to make sure the activities meet the medical restrictions.

#### 7. Education and Training:

##### 7.1. General Awareness Education.

7.1.1. BES offers initial and periodic awareness education to supervisors and employees in industrial jobs and in administrative jobs where computers are used. WMD awareness education may take many forms including briefings, newspaper articles, brochures, and computer software.

7.1.2. The objective of general awareness education is to make all workers aware of the benefits of seeking appropriate medical care before musculoskeletal symptoms progress to chronic disability. The education will cover description of WMD and the associated ergonomic risk factors, recognition of symptoms associated with ergonomic disorders, the importance of early medical intervention, and local procedures for reporting suspected ergonomics risk factors and WMD.

7.1.3. For jobs that use computers, BES tailors the training toward the specific needs of computer users and describes the proper computer workstation set-up.

##### 7.2. Targeted Training.

7.2.1. Supervisors of problem jobs and supervisors of jobs that routinely use computers provide specific initial and annual training until the risk factors have been reduced to a point that they pose no potential risk.

7.2.2. This training conveys the following specific information: Specific activities or processes that pose an increased risk of WMD for employees; proper use of existing tools and equipment to prevent WMD; and control measures and how they affect specific risk factors identified in the work group.

7.2.3. If the risk factors are associated with computer use, the training includes the proper use and adjustment of existing computer workstation furniture, chairs, and accessories to minimize the ergonomic risk factors.

7.2.4. BES helps develop and provides training upon request.

7.2.5. Supervisors record training on each employee's AF Form 55, Employee Safety and Health Record, or the electronic equivalent.

7.2.6. BES records employee training on the AF Form 2767, Occupational Health Training & Protective Equipment Fit testing.

8. Program Evaluation and Review: BES will track quality performance indicators (at least annually) for validated problem jobs to determine the effectiveness of the installation program.

8.1. Leading Indicators: percentage of workers trained; percentage of jobs evaluated; percentage of recommended controls implemented.

8.2. Lagging Indicators (using the number of workers in problem areas as the denominator): WMD incident rate; WMD severity rate; WMD restricted workday rate.

## 9. Material Acquisition:

9.1. During procurement initiatives ergonomic design criteria shall be considered.

9.2. The key to safe ergonomic design is good body movement that keeps the employee working in neutral alignment.

9.3. Design workstations to accommodate a wide majority of people who work on that job. Workstations should be adjustable and be comfortable for 90 to 95 percent of the work force.

9.4. Permit several different working positions to prevent static postures. Armrests and footrests should be available.

9.5. Frequent work should be kept within the area that can be easily reached by the hand with the upper arm in a natural position at the side of the body.

9.6. Controls, tools, and materials should be located between shoulder and waist height.

9.7. In general, the more precise the work, the higher the work surface; the heavier the work, the lower the work surface.

9.8. Edges of work surfaces should be well rounded and padded where elbow or forearm may rest.

9.9. Well designed chairs should be available. Both arm and lumbar support should be available for adjustable chair design.

9.10. Use jigs and fixtures whenever possible. Adjustable fixtures for holding items eliminates having to hand-hold items or work on pieces lying flat on tables.

9.11. Tools should be designed to avoid high contact forces and static loading; extreme or awkward joint positions; repetitive finger action; and tool vibration.